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| APPLICATION NO.                    | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|------------------------------------|-------------|----------------------|---------------------|------------------|
| 10/720,658                         | 11/24/2003  | John Terry           | 042933/303048       | 4642             |
| 826                                | 7590        | 06/14/2007           | EXAMINER            |                  |
| ALSTON & BIRD LLP                  |             |                      | DEAN, RAYMOND S     |                  |
| BANK OF AMERICA PLAZA              |             |                      |                     |                  |
| 101 SOUTH TRYON STREET, SUITE 4000 |             |                      | ART UNIT            | PAPER NUMBER     |
| CHARLOTTE, NC 28280-4000           |             |                      | 2618                |                  |
|                                    |             |                      | MAIL DATE           | DELIVERY MODE    |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

|                              |                             |                     |  |
|------------------------------|-----------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b>      | <b>Applicant(s)</b> |  |
|                              | 10/720,658                  | TERRY ET AL.        |  |
|                              | Examiner<br>Raymond S. Dean | Art Unit<br>2618    |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 03 April 2007.
- 2a) This action is FINAL.                            2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-10 and 12-23 is/are pending in the application.
  - 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-10 and 12-23 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 15 March 2004 is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    - a) All    b) Some \* c) None of:
      1. Certified copies of the priority documents have been received.
      2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
      3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) Notice of Informal Patent Application
- 6) Other: \_\_\_\_\_

## DETAILED ACTION

### ***Response to Arguments***

1. Applicant's arguments, see Pre-Appeal Brief Request filed April 3, 2007 with respect to the rejection(s) of claim(s) 1 – 10 and 12 – 23 under 35 U.S.C. 103(a) against the combination of Mantravadi and Kadous have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Kadous.

Kadous teaches in a communication system having a sending station for sending communication data upon a communication channel susceptible to distortion (Col. 1 lines 21 – 23), an improvement of apparatus for placing the communication data in a form to facilitate the communication thereof upon the communication channel, said apparatus comprising: a first mapper adapted to receive first representations of a first portion of the communication data (Figure 5, Col. 16 lines 1 – 52), said first mapper for mapping the first representations of the first portion of the communication data into first mapped values according to a first mapping scheme (Figure 5, Col. 16 lines 1 – 52); a second mapper adapted to receive second representations of a second portion of the communication data (Figure 5, Col. 16 lines 1 – 52), said second mapper for mapping the second representations of the communication data into second mapped values according to a second mapping scheme (Figure 5, Col. 16 lines 1 – 52), the second mapping scheme exhibiting a mapping property that differs with the first mapping scheme (Figure 5, Col. 16 lines 1 – 52), wherein the first mapper transmits the first

mapped values to a first antenna transducer among a plurality of antenna transducers and wherein the second mapper transmits the second mapped values to a second antenna transducer among the plurality of antenna transducers (Figure 5, Cols. 15 lines 57 – 67, 16 lines 1 – 67, 17 lines 1 – 15), the first and second antenna transducers receive and transduce only the first mapped values and the second mapped values, respectively, into electromagnetic form for communication upon the communication channel (Figure 5, Cols. 15 lines 57 – 67, 16 lines 1 – 67, 17 lines 1 – 15).

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1 – 9, 16 – 17, and 21 – 23 are rejected under 35 U.S.C. 102(e) as being anticipated by Kadous (US 6,636,568).

Regarding Claims 1, 16, 21, Kadous teaches in a communication system having a sending station for sending communication data upon a communication channel susceptible to distortion (Col. 1 lines 21 – 23), an improvement of apparatus for placing the communication data in a form to facilitate the communication thereof upon the communication channel, said apparatus comprising: a first mapper adapted to receive

first representations of a first portion of the communication data (Figure 5, Col. 16 lines 1 – 52), said first mapper for mapping the first representations of the first portion of the communication data into first mapped values according to a first mapping scheme (Figure 5, Col. 16 lines 1 – 52); a second mapper adapted to receive second representations of a second portion of the communication data (Figure 5, Col. 16 lines 1 – 52), said second mapper for mapping the second representations of the communication data into second mapped values according to a second mapping scheme (Figure 5, Col. 16 lines 1 – 52), the second mapping scheme exhibiting a mapping property that differs with the first mapping scheme (Figure 5, Col. 16 lines 1 – 52), wherein the first mapper transmits the first mapped values to a first antenna transducer among a plurality of antenna transducers and wherein the second mapper transmits the second mapped values to a second antenna transducer among the plurality of antenna transducers (Figure 5, Cols. 15 lines 57 – 67, 16 lines 1 – 67, 17 lines 1 – 15), the first and second antenna transducers receive and transduce only the first mapped values and the second mapped values, respectively, into electromagnetic form for communication upon the communication channel (Figure 5, Cols. 15 lines 57 – 67, 16 lines 1 – 67, 17 lines 1 – 15).

Regarding Claims 2, 22, Kadous teaches all of the claimed limitations recited in Claims 1, 21. Kadous further teaches a first encoder adapted to receive the first portion of the communication data, said first encoder for encoding the first portion of the communication data according to a first encoding techniques (Figure 5, Col. 16 lines 21 – 23) and wherein the first representations of the first portion of the

communication data to which said first mapper is adapted to receive comprise first-encoded values formed by said first encoder (Figure 5, Col. 16 lines 21 – 52).

Regarding Claims 3, 23, Kadous teaches all of the claimed limitations recited in Claims 1, 21. Kadous further teaches a second encoder adapted to receive the second portion of the communication data, said second encoder for encoding the second portion of the communication data according to a second encoding technique (Figure 5, Col. 16 lines 21 – 23) and wherein the second representations of the second portion of the communication data to which said second mapper is adapted to receive comprise second-encoded values formed by said second encoder (Figure 5, Col. 16 lines 21 – 52).

Regarding Claim 4, Kadous teaches all of the claimed limitations recited in Claim 1. Kadous further teaches wherein the first mapped values into which said first mapper maps the first representations of the first portion of the communication data comprises a first set of mapped values, wherein the second mapped values into which said second mapper maps the second representations of the second portion of the communication data comprise a second set of mapped values, elements of the first set of mapped values differing in value with elements of the second set of mapped values (Col. 16 lines 36 – 52, the modulation schemes are different thus the constellations that correspond to said schemes are different which means that the symbol values that make up said constellations are different).

Regarding Claim 5, Kadous teaches all of the claimed limitations recited in Claim 4. Kadous further teaches wherein the first set of mapped values and the second set

of mapped values formed by said first mapper and said second mapper, respectively, are formed of mutually-exclusive elements (Col. 16 lines 36 – 52, the modulation schemes are different thus the constellations that correspond to said schemes are different which means that the symbol values that make up said constellations are different, since the symbol values are different there is mutual exclusivity).

Regarding Claim 6, Kadous teaches all of the claimed limitations recited in Claim 4. Kadous further teaches wherein the mapping property exhibited by the second mapping scheme that differs with that of the first mapping scheme comprises vector magnitudes that differ (Col. 16 lines 36 – 52, the modulators can use a plurality of modulation/mapping schemes thus a first modulator can use a modulation/mapping scheme that differs from the modulation/mapping scheme of a second modulator said modulation schemes will have differing constellations and thus differing vector magnitudes).

Regarding Claim 7, Kadous teaches all of the claimed limitations recited in Claim 1. Kadous further teaches wherein the first mapped values into which said first mapper maps the first representations of the first portion of the communication data comprise a first set of mapped values that exhibits first geometric differences there between, wherein the second mapped values into which said second representations of the second portion of the communication data comprise a second set of map values that exhibit second geometric differences there between (Col. 16 lines 36 – 52, the modulators can use a plurality of modulation/mapping schemes thus a first modulator can use a modulation/mapping scheme that differs from the modulation/mapping

scheme of a second modulator, said modulation schemes will have differing constellations and thus differing vector magnitudes, since the constellations differ the geometric differences between the values or states of the first constellation will differ from the geometric differences between the values or states of the second constellation).

Regarding Claim 8, Kadous teaches all of the claimed limitations recited in Claim 7. Kadous further teaches wherein the first geometric differences between the mapped values of the first set and the second geometric differences between the mapped values of the second set are mutually exclusive (Col. 16 lines 36 – 52, since the constellations differ the geometric differences between the values or states of the first constellation will differ from the geometric differences between the values or states of the second constellation, since said geometric differences are associated with mapped values that are mutually exclusive the geometric differences will be mutually exclusive).

Regarding Claim 9, Kadous teaches all of the claimed limitations recited in Claim 7. Kadous further teaches wherein the mapping property exhibited by the second mapping scheme that differs with that of the first mapping scheme comprises second geometric differences that differ in lengths with lengths of the first geometric differences (Col. 16 lines 36 – 52, since the constellations differ the geometric differences between the values or states of the first constellation will differ from the geometric differences between the values or states of the second constellation, said geometric properties comprise lengths thus the lengths will differ).

Regarding Claim 17, Kadous teaches all of the claimed limitations recited in Claim 16. Kadous further teaches transducing the selected first mapped values and the selected second mapped values applied during said operation of selectively applying into electromagnetic form and delivering, by way of the communication channel, the selected first and second mapped values, respectively, to the receiving station (Figure 6, Col. 17 lines 53 – 62).

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kadous (US 6,636,568) in view of Li et al. (US 7,068,628).

Regarding Claim 10, Kadous teaches all of the claimed limitations recited in Claim 1. Kadous does not teach wherein the mapping by which said first mapper maps the first representations and the mapping by which said second mapper maps the second representations are together selected to define a layered code having combined values that are applied to a respective one of the plurality of antenna transducers.

Li teaches defining a layered code having combined values that are applied to a respective one of the plurality of antenna transducers (Cols. 10 lines 64 – 67, 11 lines 1 – 6, the space-time code enables a layered code having combined values).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Kadous with the space-time code configuration of Li for the purpose of improving the transmission efficiency as taught by Li.

6. Claims 12 – 15 and 18 – 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kadous (US 6,636,568) in view of Ketchum (US 6,731,668).

Regarding Claims 12, 18, Kadous teaches all of the claimed limitations recited in Claims 1, 17. Kadous further teaches a receiving station for receiving the communication data once communicated upon the communication channel (Figure 6, Col. 17 lines 53 – 62), a further improvement of apparatus for the receiving station for facilitating detection of the communication data, said apparatus comprising: a decoder, which exploits the difference in mapping properties between the first and second set (Figure 8A, the decoder (836a) decodes the first set), adapted to receive indications of the communication data communicated upon the communication channel and delivered to the receiving station (Figure 6, Col. 18 lines 26 – 30, lines 45 – 47).

Kadous does not teach a maximum likelihood decoder, which exploits the difference in mapping properties between the first and second set, adapted to receive indications of the communication data communicated upon the communication channel

and delivered to the receiving station, said maximum likelihood decoder for determining a maximum likelihood path that defines selection of values of the communication data, the maximum likelihood path selected from amongst a set of possible paths, each defining communication data value possibilities.

Ketchum teaches a maximum likelihood decoder for determining a maximum likelihood path that defines selection of values of the communication data, the maximum likelihood path selected from amongst a set of possible paths, each defining communication data value possibilities (Column 3 lines 19 – 26, Column 8 lines 45 – 60).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the receiver of Kadous with the Viterbi decoder of Ketchum as an alternative means of decoding a received signal thus providing an information sequence with a minimal number of errors as taught by Ketchum.

Regarding Claim 13, Kadous and in view of Ketchum teaches all of the claimed limitations recited in Claim 12. Ketchum further teaches wherein the set of possible paths from amongst which said maximum likelihood decoder selects the maximum likelihood path comprises fewer than all of the possible paths (Column 3 lines 19 – 26).

Regarding Claims 14, 20, Kadous and in view of Ketchum teaches all of the claimed limitations recited in Claims 12, 19. Ketchum further teaches wherein the set of possible paths from amongst which said maximum likelihood decoder selects the maximum likelihood path is selected responsive to a mapping scheme pursuant to

which a mapper maps representations (Column 3 lines 19 – 26). Mantravadi further teaches a first and second mapping scheme (Sections 0105, 0106 lines 1 – 6).

Regarding Claims 15, Kadous and in view of Ketchum teaches all of the claimed limitations recited in Claims 14. Ketchum further teaches wherein the set of possible paths from amongst which said maximum likelihood decoder selects the maximum likelihood path is selected responsive to a mapping scheme pursuant to which a mapper maps representations (Column 3 lines 19 – 26). Mantravadi further teaches a first and second mapping scheme (Sections 0105, 0106 lines 1 – 6).

Regarding Claim 19, Kadous and in view of Ketchum teaches all of the claimed limitations recited in Claim 18. Ketchum further teaches prior to said operation of decoding, of selecting the set of possible paths from which the maximum likelihood path is formable (Column 3 lines 19 – 26).

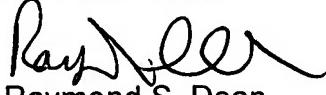
### ***Conclusion***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond S. Dean whose telephone number is 571-272-7877. The examiner can normally be reached on Monday-Friday 6:00-2:30.

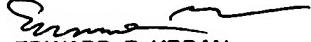
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward F. Urban can be reached on 571-272-7899. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2618

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Raymond S. Dean  
June 7, 2007



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